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The author objects to criticism of current programed language instruction (PLI) materials. In a "conventional FL (foreign language) class" of 120 class hours a year, the amount of time spent in active, immediately reinforced responding by any individual student would be less than 100 minutes. This is in contrast to the shortest PLI program (53 class hours a year), in which a student spends at least 40 percent of his time responding. The implication is that the intensive, controlled responding that characterizes PLI (and many other methods of FL education) may be quite effective, but that it is not merely as effective as other processes of learning." The most relevant and effective processes may be under the student's rather than the pedagogue's control. The author examines the relevance of transformationalism to FL pedagogy and the various possibilities of using such language learning mechansims as "intentional imitation," "shadowing," and "feedback." In discussing how programing can develop various skills for further learning, he points out that developing "self-critical skill" can serve in the future acquisition of phonology, and "inferencing" can aid in acquiring new vocabulary. Branched, rather than linear, programing implies an acceptance of individual differences among students. Programers should study artists' control of audience responses. (AMM)

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EXTENDING THE PSYCHOLOGICAL THEORY AND EDUCATIONAL POSSIBILITIES OF PROGRAMMED LANGUAGE INSTRUCTION

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At last year's Kentucky Foreign Language Conference, William Clark[4] reported that in a number of introductory college foreign language courses students using PLI did as well as -- or better than -- students in the general college population on the MLA-ETS Cooperative Tests. The amount of time the students using PLI required to achieve the scores equivalent to one year of college foreign language study ranged from 53 to 94 hours in a Spanish program and from 135 to 200 hours in a German program. The Mueller-Niedzielski Basic French[11] programmed course requires approximately 84 hours to achieve the equivalent of an initial college year.

I think that 120 hours might be taken as a reasonable estimate of the number of hours of classroom instruction required --or at least, provided-- by a conventional first year college FL course. A student might be expected to spend between 80 to 100 hours of outside preparation, presumably not required of a PLI student, in addition to the time spent in the class and language laboratory. The smallest total number of hours required by a conventional course, (200 hours) is equal to the largest amount spent on any programmed course.

The implication that seems to be suggested by these, as yet spotty, data is that PLI wins a "hands down" victory over conventional FL instruction in respect to efficiency for the student. And yet Albert Valdman suggested at last year's conference[12] that "adherence to the orthodox Skinnerian principles (which characterized at least parts of the programs referred to in Clark's report) and failure to consider a more powerful and adequate theory of language is responsible for the general inefficiency (italics mine) of currently available programmed FL materials and the lack of impact these materials have had on FL instruction in this country."

Unless my calculations are in error, it is difficult to see how Valdman could arrive at his conclusion. I should prefer, however, to assume that my calculations are essentially correct and nevertheless attempt to ascertain what might have prompted Valdman to perceive PLI as he did.

The first possibility that suggests itself is that the MLA-ETS Cooperative Tests are not valid measures of FL performance and competence and thus generate false conclusions in comparisons between courses in respect to achievement. While it is possible that the validity of the tests are yet to be further refined, it is unlikely, however, that any intuition that Valdman may have had about individuals whose test scores did not correspond with their FL competence would not have been as applicable to students in conventional FL classes as to students of PLI.

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Another possibility is that Valdman's point of departure was a subjective sense of inefficiency experienced while attempting to be a student of a PLI course. If this was the case, I have shared such an experience. F. Rand Morton's [10] discussion of "problem areas" and Clark's report suggest that others may also have felt that their time was not entirely well spent completing PLI frames. A hypothesis comes to mind which states: given the amount of effort and energy required by PLI, the amount of learning is comparatively low. In other words, if the efficiency of a mode of instruction is measured by relating the amount of effort required from the student (subjectively assessed) --rather than the amount of time-- to the amount learned, PLI does not seem to be as efficient as other methods.

It would be rather simple to design a first approximation of a test of the hypothesis suggested in the preceding paragraph using appropriate questionnaires. Since I know of no such study, however, let us examine the conventional foreign language class as a possible source of relevant data. In such a class one might select at random some individual students for observation and note the amount of time they spend "responding." If the teacher lectures a good deal and uses a technique involving individual recitations, any individual student might be required to respond for less than a minute during a full class period. If the teacher is given to leading "whole class" choric drills, the amount of time spent responding may increase markedly but the amount of evaluation and "feed-back" provided any student is correspondingly markedly reduced. Undoubtedly, an attempt to estimate the amount of active, immediately "reinforced" (i.e. evaluated and rewarded) responding enjoyed by a student in a conventional foreign language classroom during an entire school year would yield a quantity less than 100 minutes. On the other hand, programs are generated essentially by a psychological theory and an educational philosophy which hold that we learn by doing. And at least 40 / of the time spent by a student of PLI on the shortest program (53 hours) is spent responding.

I think that we have arrived at the implication that the intensive, controlled "responding" that characterizes PLI (and many other methods of FL education, too) may be quite effective, but that it is not merely as effective as other processes of learning. E. L. Thorndike [7] already knew that repetition alone - repetition, perhaps of the type advocated by Professor Morton [10] - was Quixotic. But not much thought has been given to the possibility that the most relevant and effective learning processes might be under the student's, rather than under the pedagogue's control. The fact that "motivation" figures so large in all discussions of learning should have, perhaps, hinted at this possibility. In this context, the assertions of the transformationalists, represented in this discussion by Albert Valdman, bears further examination. Learning processes of considerable power for the acquisition of languages may be revealed, or at least implicated as worthy of further exploration.

Transformationalism

One might hear the echos of the age-old psycho-philosophical dispute between nativism and empiricism if one reads Valdman's and John Carroll's [2] papers at last years conference in a philosophical mood. The transformationalists are nativists. They hold that the minds men are born with shape the nature of their knowledge, their thought, and their perceptions. And in this context an empiricist may be defined as one who holds that what a man knows and thinks and any particular habits of perception he may exhibit are the consequence of encounters with reality. If there is a mind, it is moulded by experience, but if the empiricist is an American behaviorist or "S-R psychologist" he feels that it is easier (if not better) to talk about behavior as the consequence of experience and he will prefer to omit referring to mind.

I think that researchers in foreign language pedagogy, that is, linguists and educational psychologists, tend, particularly in America to be empiricists. The pre-eminence of experience over mind would seem to be a natural corollary from the fact that there are many languages in the world and that infants learn the languages of their environments. And individuals dedicated to transmitting culture and imparting skills to the young can be most hopeful if their point of departure is a tabula rasa and a belief that the young are malleable by experience.

The transformationalists bring a different view of foreign language pedagogy. They point to the fact that the particular set of design features that characterize human language is species-specific and universal to the species. Generativity alone may be an adequate argument for nativism because no model of an organism which states that its "outputs" are completely contingent upon its "inputs" can account for the occurrence of novel sentences. Their view implies to the FL pedagogue that a certain innate preparation for language exists that may be expected to facilitate the acquisition of any language; that simple laws of learning are not adequate to account for the acquisition of language and the exploitation of these simple laws in FL pedagogy is a comparatively feeble expedient; and that the very nature and structure of all human language is related to the innate preparation for acquiring language.

At least some psychologists persuaded by Chomsky's theorization would take the case of certain singing sparrows on the American West Coast as a partial prototype of language acquisition, (although Chomsky clearly insists that animal communication is not language and that no notion that human language evolved from animal communication is implied.) These birds produce identifiable components of their songs at specific stages of their lives even if they are raised in isolation. Their song remains incomplete, however, unless at a certain "critical period" they have an opportunity to hear the song of their own species. If the infants grow up in association with members of their species they acquire the characteristic "dialect" of their associates; a dialect, which indeed, even exhibits geographical isoglosses within the species [9]. The case of these birds becomes all the more tempting as a prototype for the acquisition

of human language when it is noted that the babble of human infants in the crib is quite universal throughout the human species. It is exhibited by deaf children who will eventually fail to learn to talk. Speech is exhibited, as far as we know, only by individuals reared in association with other humans.

Close examination of the nativistic view reveals, however, a number of difficulties as to what nativism actually means and as to facts and evidence that tend to invalidate the position. First, there is the general, and rather extreme statement of Chomsky's that

> "there is no more reason for assuming that the basic principles of grammar are learned that there is for making a comparable assumption about, let us say, visual perception."

But what of the classic psychological studies[14] that revealed that certain individuals, blind at birth, had to learn recognition as a skill when sight was medically restored to them? And some of these individuals continued to depend on hearing and touch for their cues. Certainly a careful sorting out of the components involved in the relations between the organism and the ways in which it relates to its environment is called for before highly generalized formulations are established.

Second, it is necessary to note that native, "wired in", or instinctual behavior patterns are more characteristic of species low on the phylogenetic continuum than of species high on this continuum. The well known dances of the bees[13] is a favorite example of a highly instinctual behavior pattern. Not only are they not learned, they are also not amenable to modification through experience. There seems to be a certain reciprocity between the degree to which an organism's behavior patterns are genetically predetermined and the degree to which the organism is capable of acquiring novel behavior patterns. Adjustability to novel circumstances is more characteristic of learned behavior than of native, instinctual behavior. The more nativistic one's position is, the more it is appropriate to lower animals than it is to humans.

Third, it may be noted that "generativity", which may be regarded as the linguistic counterpart of <u>adjustability</u> of behavior may be reduced to a question of "levels of discourse". If one distinguishes between the form or structure of language on one hand, and the content of messages on the other hand, it is not difficult to take a position which holds that the determinants of the linguistic form occur at a linguistic level and the determinants of the content of a message occur in the environmental stimuli that impinge upon a speaker. It is perhaps true that simple S-R psychologies <u>can not</u> handle such a formulation very elegantly. Psychologies that see behavior organized in hierarchical structures, such as Hebb's or the Miller, Pribram, and Gallanter formulation should, however, prove to be very apt for

explaining generativity as a consequence of the fact that the lawfulness of a linguistic utterance may occur at one level and the content of a message may be determined by an altogether different array of factors. Such psychologies need not be nativistic in their orientations and, in point of fact, they tend to be the very opposite. Yet Hebb's formulation is replete with a variety of native mechanisms that interact with the environment. For humans it might be most useful to search for a large array of molecular mechanisms than to take a gross nativistic position which merely begs the question.

Since they see language as a manifestation of mind, it is quite logical for transformationalists to subject their linguistic analyses to psychological validation. They are probably the first of the modern linguists to do this. To date laboratory experimentation involving the effects of linguistic structures on perception and memory[5] and studies of the acquisition of language in infancy[1] have tended to bear out the correctness of their formulations. Had these experiments and studies failed to corroborate their formulations, the transformationalists would have been required by their own logic to reformulate their linguistic analyses to correspond with the psychological data.

Typically, other approaches to the analysis of language were not concerned with the relevance of a linguistic formulation to the "minds" of the speakers of language. The validity of a linguistic formulation depended on the logic the investigator brought to his analysis and raised no questions as to what a speaker of a given language might think about such a formulation. Indeed, if the linguistic structure of a given language was in any way related to the thinking processes of the speaker, it was the language, in the view of such theorists as Sapir and Whorf, which shaped the mind of the speaker.

Thus while some linguists see language as a stimulus relevant to psychology, the transformationalists see linguistics as a discipline continuous with psychology. The transformationalist view might be expected to prove itself very relevant to FL pedagogy. To date, however, its relevance seems to have been incompletely developed. No specific suggestions seems to be forthcoming. Nor has the necessity for taking a transformationalist point of view in order to conduct effective FL pedagogy been established. The transformationalists would be the first to note that a language will be acquired by a student irrespective of the linguistic analysis his teacher may have made of that language. Few infants, indeed, are taught their native language by linguistically sophisticated parents. As far as I know, the notion that there is an innate preparation for language learning has not, to date, yielded any clues as to the process by which any language is acquired or as to how a foreign language might most effectively be taught. In my view, the accomplishment of the transformationalists in this region has, to date, consisted of pointing to the fact that S-R formulations are not completely adequate for understanding the acquisition of language. Thus our attention is directed to a search for more of the mechanisms and processes by which

language may be acquired.

Let us now turn to some first guesses as to what these additional mechanisms and processes might be and to an analysis of whether they are of relevance to PLI.

A Short List of Possible Language Learning Mechanisms

A. Language Attention In psychological terms, attention occurs when the receptors of an organism are oriented to a group of stimuli. In humans it seems that attention is usually a necessary condition for determining what information will be retained for storage in long term memory. (Stimuli that are perceived but not attended to seem to leave little or no record upon human memory.)

In language acquisition we may allow attention to mean more than the mere orientation of sensory receptors. We may allow it to mean the intense way a 24 month old child observes an adult who talks to him or who tries to teach him to talk. Try saying "anthropologist" to a small child and watch how he looks at your lips. He may be solemn or joyful, depending on his nature and mood, but he is involved. "Language lessons" may be one of a very small category of activities that can interrupt other activities of an infant without encountering vigorous objections. Having said "anthropologist" once you may expect signals to repeat it. After a few repetitions, your pupils may attempt the word in your presence. He is most likely, however, to leave the scene, if you persist in coaxing him to imitate you, only to be heard some hours later attempting approximations of the utterance to himself or to other adults.

I am suggesting that there may be a "language search" or "language attention" mechanism. (I think that the researches of Ruth Wier[illegible]h bear me out.[15]) It may be an "innate" mechanism because there is little evidence that language attention requires reinforcement to maintain it, (except in the case of autistic children, who may well be congenitally defective in this mechanism, and who respond, in behavior therapy, to reinforcement for attention to language production.) Otherwise, --to put it in Skinnerian terms-- language stimuli seem to be reinforcing in themselves.

It is likely that language attention is a mechanism characteristic only of young children. There may be a critical period after which it is no longer observable. If this is the case, it is not a mechanism to be exploited by PLI. On the other hand, it is also conceivable that this mechanism may be re-aroused in later life by total immersion in a new linguistic environment. If that is the case, it might be useful for PLI. Indeed, since a "language attention" mechanism is merely hypothesized here, it remains to be systematically studied. We cannot even be certain that PLI as it is practiced today fails to arouse it.

B. Intentional Imitation Volumes have been devoted to the role of imitation in language learning and neither the data nor the issues need be reviewed here. There is a dimension which

I would call "intentionality" which does seem to merit attention in the present context. Since intentionality is to be considered a characteristic of the pupil, rather than a variable under the control of the pedagogue, it may be a phenomenon continuous with attention, discussed in the preceding section

Observations in a FLES (foreign language in the elementary school) classroom reveals many children quite frequently imitating the teacher's utterances sotto voce. Though my data were not systematically collected, I feel certain that while one sees this kind of imitation also in the junior high school classroom, one sees less of it. Still less is seen in the high school classroom. In conventional college classes there may be few students who spend their time imitating the teacher's utterances to themselves, but these "serious" ones seem to have revived a childhood practice. A conversation between a 6 year old child and a 30 month old child, on the other hand, might sound like a conversation between a child and a parrot to a listener in an adjacent room.

Intentional imitation may be one of the mechanisms unintentionally exploited by the conventional classroom to supplement the small amount of controlled, reinforced responding occurring in such a classroom. It may be a factor of considerable potency in accounting for the learning occurring in the conventional class. It may be one of the kind of factors mentioned earlier that come under the control of the student rather than the pedagogue.

It is important to note that what I have called "intentional imitation" is essentially a self-directed process. It is exhibited most frequently by individuals who know nothing about the roles played by imitation and repetition in formal psychologies. Indeed the waning of the use of the mechanism seems to be correlated with the increased encouragement by pedagogues to imitate and repeat. (I doubt, however, that there is much of a causal relation here.)

Intentional imitation, being a self-directed process, seems to require freedom for the student to use it at his own rate. In a relatively permissive classroom or in a freely operating linguistic environment such as a home, the pupil or child selects an utterance or a component of an utterance for imitation and practice. He allows a large number of linguistic inputs subsequent to the one he selected to slip by unnoticed. In a classroom this is extremely inefficient, since it implies that a large part of the inputs intended for the pupils are wasted. Yet the mechanism may be so powerful that it is worth the waste for the student who employs it.

PLI as it is currently practiced probably tends to obviate the exploitation of intentional imitation rather than foster it. Since the student is required to respond to each frame, he must work on what the programmer has selected for his attention rather than on what he might have selected for himself with true self-direction. Since pedagogical research has been so intently focused on what the teacher ought to do for the student, very little is known about the criteria and variables that enter into what

a student might select for himself for imitation. There is the possibility that each student may be a better judge of what he needs to attend to at least at certain points in a course of study than the programmer can be.

It is granted that "intentional imitation" is merely a hypothesized mechanism and much research is required to confirm its existence and to characterize the circumstances under which it operates. Yet there is enough reason to believe in its existence to consider strategies by which intentional imitation could be utilized in PLI. Such strategies might consist simply of providing devices by which students can delay inputs from the program and instructions that would encourage him to practice intentional imitations whenever he might find them appropriate. More sophisticated devices that make it possible for students to "call-up" utterances for imitation are within the competence of current technology and are, at least to some degree, utilized in various automated instructional procedures such as computer assisted instruction (CAI) programmed instruction in general and some PLI.

C. "Shadowing" and Feedback. At last year's convention J. B. Carroll [2] noted that "shadowing", or concurrent performance with a model, had been useful in curing stuttering and suggested the possible usefulness in FL instruction. I think that if we were to study the use of shadowing outside the laboratory, we would find that it is used in language learning and that children are more given to learning by shadowing than adults are. Children shadow each other and teacher-models extensively in choral recitations and singing. In the FLES classroom there is the danger that pupils will shadow each other's poor renditions instead of the presumably correct model of the teacher.

It is to be noted that delayed auditory feedback (DAB), the procedure in which one's own voice is piped into one's ears somewhat delayed after the utterance, is more effective in disrupting adult speech than in affecting children's specch. It is difficult to interpret this fact and a large number of apparently related facts in the present context. Some connection between DAB and shadowing seems inescapable, however, and the possible positing of still another, perhaps innate, language learning mechanism seems to be but a short distance off.

The mechanisms noted thus far seem to be related to childhood. Some of them may be evanescent at later stages of development. The implication for PLI is obviously that the methods used, the language learning mechanisms exploited, and the very objectives of any program must be adjusted to the developmental level of the students. Indeed, if we are at all serious about FL pedagogy as an educational undertaking, we might be well advised to give considerable thought to language learning curricula appropriate to

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Our discussion of intentional imitation is obviously formulated with the audio-lingual mode of language learning in mind. It seems to be most relevant to this mode. Its possible applicability to the reading-writing mode should, however, not be completely disregarded.

each level of psychological development and oriented more to the development of language learning skills than to acquisition of specific languages.

There remain two mechanisms that might be added to this list that are not as closely related to childhood as the three discussed above. These are "inferencing" and "hypothesis testing". There are clearly skills that can be developed by explicit instruction and are relevant not only to learning the material taught by a program but to further language learning. That is to say, these are skills that can be acquired in the process of learning a language which can prove to be useful to a student after he completes formal instruction and in acquiring a third foreign language. It seems appropriate, therefore, to turn now to the entire issue of the development of skills for further learning.

Can Programming Develop Skills for Further Learning?

Educational psychologists often ask questions about "transfer"; about whether learning in one situation is relevant to behavior in another situation. Educationists also want to know whether learning one or another item prepares the student for learning something else. What helps us learn to learn? Do we learn in the initial phase of a study skills that will help us learn in subsequent stages?

The programming movement --with its emphasis on "specifying terminal behavior"-- coupled, perhaps, with the achievement test movement --with its emphasis on clarifying what a student ought to know from the study of a given curriculum-- have, it seems, somewhat distracted education from its concern for further learning. There is currently in vogue a "behavioral specifications" movemant which seems to have derived its impetus from the programming movement. Adherents of this movement argue, often quite justifiably, that vague and unspecific formulations of educational goals are but rationalizations for continuing time-worn and dysfunctional practices. If education can describe explicitly what it wants to do, it will be in an excellent position to formulate curricula and methods for achieving its goals.

The search for behavioral specification often results in descriptions of educational outcomes that are restricted to small items of information and clearly circumscribed skills; these are antitheses of leaning to learn. A counter-trend within the movement emphasizes "process goals", however. Process goals, superficially defined, are modes of learning and thinking which might be learned while acquiring the information or skills of a curriculum or which might even be developed without reference to any particular item of educational content. Process goals are related to further learning and problem solving abilities.

There are some fascinating possibilities in foreign language education and PLI in particular for developing skills for further learning. One example originates from the fact that there are no reliable, reasonably inexpensive mechanisms to make judgments as to the linguistic acceptability of a spoken utterance. Thus programmers had to find a method to prepare a student to evaluate his own responses. Once such a self-critical skill is acquired,

it can serve in the future acquisition of the phonology of a language.

The "discrimination frames", apparently designed by F. Rand Morton, were designed to enable the student to distinguish acceptable renderings of the target language phonology from undesirable ones. Once the skill is developed, the student is expected to apply it to all his future utterances and to monitor his own speech.

Dr. Morton's presentation at last year's conference[10] gave some indications that the procedure did not work properly; he felt a huge number of repetitions were needed to supplement the procedure. Two possible explanations to account for the ineffectualness of the procedure come to mind. Neither imply that an astronomical number of repetitions would be an antidote for the ineffectualness. The first possibility is that the domain chosen for developing the self-monitoring skill, native-like pronunciation of speech sounds, is not an appropriate one for adult humans. It may be that most of Morton's college students were past the "critical period" during which native-like pronunciation could be achieved. (Some, perhaps those with unusual linguistic aptitudes or those who had been exposed to the phonologies of several languages in their infancy, could achieve the goal because for them the critical period had been extended.) Morton's programming might not have been properly adjusted to his target population.

Second, it is possible that the discrimination frames alone fail to develop an internal model or schema for evaluating a speech sound. The "wrong" rendition in the discrimination frame may have been a rendition likely to occur when the phoneme in question is attempted by a speaker of English. Such a rendition might be familiar to the student --he might have an internal model of it-- and it would be comparatively easy for him to recognize it as wrong although he might not be able to identify the correct rendition. Practice may be needed in recognizing correct and incorrect renditions in isolation. This might require intentional imitation. Further, practice in evaluating one's own response might also be necessary. Whether such practice makes use of play-back devices or requires the student to rate his utterance directly, it may be that the development of the self-critical skill in question can be achieved only with the aid of an external evaluation -- if at all. Our first example may prove to be a "good try" but not a total success.

Sequencing in PLI is known to be important to accelerating further learning. It is said that V. I. Lenin thought that vocabulary was the most important part of language and began studying languages by memorizing lists of nouns and verbs. While this approach would seem at first blush to maximize the amount of information that can be encoded or decoded by a novice to a language, it is no surprise to FL educators to learn that Lenin achieved the most laughable results. His method yielded many misunderstandings in communication, provided no pay-off in terms of generativity, and failed to provide

skills for further learning. It is almost a truism in FL education that an emphasis on structure should precede an attention to content. Indeed the major arguments revolve around which structures provide the best pay-offs.

Once a portion of the structure of a language is mastered, it becomes possible to acquire new vocabulary by a process I once chose to call "inferencing"[3]. The possibility of decoding new vocabulary on the basis of syntactic, morphological, contextual, and other types of cues has been noted and sporadically proposed in the history of FL education, Components of this process have been systematically studied. My exploration of the process in the junior high school classroom has convinced me that extensive use of the process could yield considerable pay-off in acquiring a new language. Inferencing seems to be a language learning mechanism that some students make use of without instructions to do so. Others are wary of it and have, perhaps, been warned off by highly contrived, invalid examination items that punish inferencing. Many students could be taught good inferencing skills. Professor Mueller has suggested to me that a sub-program for developing inferencing skills could be written. Such a sub-program could be inserted in a longer FL program at some point after the phonology and major portion of the structure of the language is mastered, and before extensive emphasis on reading is initiated. I am delighted and challenged by the prospect of joining forces with Professor Mueller on such a project. It would provide an excellent example of using PLI to develop skills for further learning.

"Inferencing" and "hypothesis testing" are closely allied processes. When the validity of an inference is checked by examining whether all the available cues yield the same result, inferencing becomes an instance of hypothesis testing. Dr. Garvey's [6] presentation at last year's conference described the development of "limited hypotheses" and "guided concept formation" in respect to morphology and syntax. This is an approach which makes use of an intellectual process --but does not develop it-- as a language learning mechanism.

Hypothesis testing and concept formation are processes observed in adult humans in almost every domain in which the intellect functions. It is doubtful, however, that these are language learning mechanisms per se, particularly since infantile functioning is quite different from adult functioning in regard to these processes. Indeed, the maturation of these processes does not seem to take place until well after the first language is mastered.

Dr. Garvey was not concerned with developing hypothesis testing and concept formation as language learning skills. She depended, instead, upon the formation of "limited hypotheses", where students were presented with restricted segments of linguistic data in order to arrive at certain predetermined conclusions. One is concerned that such a contrivance might lead the student into difficulties in "real life" encounters with the language if he should attempt them before completing the program. It would seem to be a simple matter, however, to include in Dr. Garvey's program

some attention to the process of hypothesis testing, its limitations, and possible extensions for use in further learning.

The present discussion revolves around the notion of characteristics of the students. It is well known that characteristics vary from individual to individual. A final question for our attention is whether a philosophy of programming formulated in terms of characteristics of students can provide for the variations that are likely to occur among students.

Does Programming Provide for Contingencies?

It may be claimed for (some) classroom teaching that it is a situation in which the teacher makes an evaluation of a student's performance and provides for his needs for improving his performance. A tutorial relation thus provides for contingencies, for events that may occur, but are not necessarily expected or desired. Any performance by a student can lead to any of a large number of new requirements from the teacher.

Learning exlusively from books does not provide for the contingencies of misunderstanding. Listening to recordings provides no assurances against misapprehension, nor does film; nor does lecturing. Nor, for that matter, does teaching in what might be called the "pseudo-Socratic" mode, where the teacher asks only rhetorical questions, even if he asks them constantly. This kind of teaching functions, perhaps, mainly to keep the class awake.

Some teachers can take care of contingencies. So can some computer programs. Linear programmed instruction is programming in which no mistakes are expected. It provides for contingencies ostensibly by eliminating the possibility of their occurrence. Such programs are pre-tested and re-tested and re-tested until there is reason to believe that undesired responses will not be elicited. The anticipation that such a strategy will succeed is based, of course, not only on the assumption that behavior is orderly and predictable and that one may safely extrapolate from samples of population, but also on the contention that enough is known about the laws of behavior and learning to justify the attempt. I think that we know enough about the language learning process today to sense that we are but at the threshold of some important discoveries as to its nature. But we are a long way from being prepared to succeed with purely linear programs that are applicable to large populations.

In a sense some linear programs provide for individual differences by keeping the difficulty of the frames at the lowest common denominator of its target population. Thus there are many frames that are easy and obvious. Some of these assume some of the quality of the pseudo-Socratic mode that some classroom teachers are wont to use. And if we are to judge by some of the reports at last year's conference which revealed that working on programs was fatiguing, we may guess that obvious frames may not only function to keep the learner awake, but they may also tire him out. Providing for contingencies by making the program easy and preventing

incorrect responses is inefficient in the extreme. In the initial stages it may help the morale of some students. Apparently, however, motivation to work on such programs must eventually come from sources other than the program.

Branched programming is conceived of as providing for contingencies. There may be remedial branches and diagnostic frames. A commitment to branching implies an acceptance of individual differences and the possibility that individuals will learn at a variety of rates. Some thought has been given to the possibility that individuals will learn in a variety of ways. But I do not know of much work that has been done to identify the intellectual styles of students and to make provisions for them.

Attempting to write branched programs implies even greater presumptiveness than attempts to write linear programs. For the writing of a perfect branched program implies that we know enough about the myriad ways in which learning occurs and can provide for all of them. Yet branching seems to be the wiser strategy. We know something about <u>some</u> ways of learning. And the provision of each branch that is likely to be effective with some students reduces the inefficiency of the enterprises by an amount proportional to the number of students for whom the provision is made.

In a certain, rather large sense, programming turns out to be a new form of communication that makes use of innovations in communicative media. It is not surprising that we are only partially aware of the psychological implications of using such media when one considers that we do not even know much about the psychological implications of using orthographic or pictographic writing systems. Professor Mueller[11] revealed some awareness of this problem when he noted the difficulties students encountered when they had to listen but were given nothing to look at. His provisions for this problem in his <u>Basic French</u> and Garvey's provision for this problem are admirable. But we are a long way from exploiting the possibilities that may exist in being able to provide, perhaps, independent inputs in two modalities simultaneously.

Further, programming may be considered a form of communication with which the sender can do something in advance about the possible responses of the receiver without being present to get feed-back from the receiver. In this light, programming becomes something of a huge innovation for mankind. If the possibility of providing for contingencies is as novel as I think it is, it is not at all surprising to discover that we are lacking in knowledge to provide for these contingencies.

I think, however, that artists, that is, dramatists, poets, painters, and musicians, already know much that is of value about the kinds of responses their art is likely to evoke. And since they are accustomed to addressing audiences distant in time and space--audiences over which they have no control--they are likely to be most skillful in evoking responses that will maintain interest and "motivation". A dramatist with a message that takes

several hours to develop cannot ask you half-way through his play what you understand by it. He must devise his play in a way that will keep your attention and make his message as unambigous as possible.

Artists are knowledgeable about the emotional domain; a domain in which pedagogues seem to be patently ignorant. Yet emotions play a large role in all programmed responses. It might thus be of some value for programmers to study some of the skills, methods and approaches that artists use to anticipate and control the responses of their audiences. Obviously some artistic experiments are failures. I think that the key of a successful artist is the fact that he works with a sympathy for his audience. He feels continuous with his autience and expects its responses to be much like his own. Thus the simplest technique is to test one's conceptions upon one's self before exposing it to an audience.

If my guess about the way artists work is correct and if this approach is of any value to programmers, it would make a virtue out of attending to the obvious. It does not take years of research and re-testing to discover that a certain voice on a tape may be repulsive or that a certain type of instruction is irksome, and that a thousand repetitions are useless and infuriatingly boring. Nor is it difficult to discover that a different kind of exercise may be "fun". What programmers may have to learn to do is attend to their own reactions.

We may presuppose a certain kindliness and desire to please pupils on the part of a programmer that allies himself with artists. Like a dramatist, he must be willing to do something to keep the attention of his audience. A commitment on the part of education to "self-instruction" signals an end to the days in which the schoolkeeper could disregard the feelings of his captive audience and even delight in discomfiting his pupils. What then of so-called self-instructional programs which require monitors to pace the laboratory like prison guards, which require frantic administrative machinery to devote a large portion of its energy to keeping the "response rate high", and where lopsided contracts and deals about grades are needed to keep the students in their seats? These are not marks of an innovation. These are the status of schools before the advent of programming. The implications for me, derived from the data available to me at this moment, are that much remains to be done in the way of understanding language learning mechanisms, in the way of understanding and developing skills for further learning, and in the way of providing for contingencies and making study palatable. PLI has helped us focus our attention on these needs. Yet PLI will remain at the threshold of its possible success unless an effort is made to expand the psychological theory upon which it is based and unless consideration is given to expanding its educational possibilities.

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for NAR Editors

22 nd F O R E I G N L A N G U A G E C O N F E R E N C E

April 26, 1969

PAPERS SUBMITTED

for

THE SEMINAR ON PROGRAMMED LANGUAGE INSTRUCTION

Dr. Donald J. Lloyd
Professor Simon Belasco
✓ Professor Aaron Carton

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POLICY STATEMENT

The Executive Committee of the Kentucky Foreign Language Conference wishes to make the following statement about making available the papers of the Seminar in Programmed Language Instruction, and, hopefully, in other sections at future conferences. Every year many requests are received for the papers presented in some areas, but in particular, in foreign language instruction, since it is a practical and often burning issue. The Committee has, therefore, decided to make the papers in PLI available this year on a trial basis, and to devote the session to discussion among the participants. The Committee, herewith, neither endorses nor promotes any Program or textbook, nor were its members aware of the content of any of the papers before they were received. The fact that one of the members of the Committee is also the author of a Program being discussed is purely accidental.

PREFACE TO THE PAPERS

Since 1967, the section on Language Learning has been devoted to PLI in an attempt to focus on one issue of the learning problem and to induce scholars and experts in this field to explore the issues. The Committee is fully aware that passionate feelings exit on the subject of PLI, particularly among Professors of Literature. However, to ignore this field of scholarship is an unscholarly attitude.

The inefficient manner in which a FL is being taught or learned in our traditional classrooms has been the source of grievance to many students. They feel that such a requirement in their basic studies program is unacceptable if and as long as the language skills cannot be acquired in a more reasonable amount of time. In a number of well known colleges the FL requirement has been reduced or dropped because of this problem.

Learning efficiency is the topic of two papers: Dr. Lloyd, a linguist who taught at Wayne State University and is now in inductrial programming with the Resources Development Company, looks at the problem as an outsider, as a Corporation Executive would, asking whether this means of instruction can develop the skills his employee needs in a foreign country. Dr. Lloyd was invited to write a paper as an outsider and to examine critically the practical problems involved. Professor Carton, a Psychologist recommended to the Committee by Dr. J. B. Carroll, looks at the same question and asks why students feel that learning a FL through PLI arouses feelings of inefficiency. He suggests reasons for these feelings and means by which the problem might be solved, and, at the same time, the art of programming might be further advanced.

Professor Belasco sees a greater problem than the one programmers have set for themselves: how can language <u>proficiency</u> be taught, rather than individual skills. He challenges the profession to think beyond the present limited objectives and proposes new approaches to the problem. He too is concerned about the students who must pass the FL requirement.

The Executive Committee